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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

DETAILED ACTION

Claim Objections

1. With respect to claims **29**, **36** and **46**, the limitation is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The limitations of claim 36 have already been set forth in the parent claim 25.

Claim Rejections - 35 USC § 112

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims **25**, **31**, **34**, **41** and **44** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

2. With respect to claim **25**, page 2, 3rd paragraph, and claim **37**, page 7, 9th paragraph, the limitation "at least one of the light receivers" lack antecedent basis. At least one light receiver, singular, was previously noted in the claim, therefore it is not necessary that there be a plurality of light receivers. Correction is required.

3. With respect to claim **25**, page 2, 7th paragraph, and claim **37**, page 8, 1st paragraph, the limitation "'a symmetrical 50% duty cycle square wave signal is processed....and carries equal

frequency and phase in terms of zero-crossings" is unclear to the examiner. The limitation does not clearly define to what the square wave signal is equal in frequency and phase to. Clarification is required.

4. With respect to claim **25**, page 3, 4th paragraph, and claim **37**, page 8, 3rd paragraph, the limitation "an intensity...follows the carrier waveform signal....at least one detected light ray is demodulated from the carrier waveform signal" is unclear as to its antecedent basis. Two carrier waveforms have previously been claimed, the common carrier waveform and different carrier waveforms for the light source. It is unclear as to which this limitation intends to refer to.

5. With respect to claim **25**, page 3, 5th paragraph, and claim **37**, page 8, 4th paragraph, the limitation "the symmetrical square wave signal...is used for rectifying photocurrent signal" is not a positive limitation but rather only implies intended use. The applicant is not clearly limiting the method claim to the step of rectifying the photocurrent signal with the symmetrical square wave signal but rather implying the intended use of the symmetrical square wave signal.

6. With respect to claims **31** and **41**, line 12, "analog signals" lack antecedent basis. Although the independent claims 25 and 37, disclose an AC voltage signal, there is no indication that analog signals are produced by the demodulation or synchronised detection circuitry. Correction is necessary.

7. With respect to claim **34**, line 4, and claim **44**, line 4, the limitation "defects that may feature aspects of the following..." is considered indefinite since the phrase "may" defines a broad range followed by narrow limitations and does not clearly set forth the metes and bounds of the

patent protection desired. The term “may” is an optional phrase and does not define positive limitations in the claim.

8. With respect to claim **35**, the limitations “detector module” and “detector array” in lines 3 and 4, lack antecedent basis.

9. Claims **29** and **30** are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential cooperative relationships of elements, such omission amounting to a gap between the necessary structural or methodological connections. See MPEP § 2172.01. The omitted cooperative relationships are: the photocurrent converted to voltage, the photocurrent or voltage amplified, and the limitations in claim 25. It is unclear at which point these new limitations are inserted in the previously claimed method of claim 25.

10. Claims **31** and **41** are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential cooperative relationships of elements, such omission amounting to a gap between the necessary structural or methodological connections. See MPEP § 2172.01. The omitted cooperative relationships are: the fault detection circuit and the rest of the limitations found in claims 25 and 37. It is unclear at which point these new limitations are inserted in the previously claimed method of claim 25 or how they are related to the structure of claim 37.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims **25, 26, 29, 30, 32, 33, 34, 35, 37, 38, 42, 43, 44, and 45** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kreuzer et al. U.S. Patent #4,937,449 in view of Preikschat et al. U.S. Patent #4,871,251.

1. With respect to claim **25**, Kreuzer et al. discloses a device for the inspection of films comprising:

- Providing at least two light emitters (Figure 1, light sources 2, 2')
- Providing at least one light receiver (Figure 1, detector 3)
- Providing at least one signal generator connected to at least one of the light emitters and at least one of the light receivers (Col.3, L 32-45, Col.4, L 20-25)
- Providing means for converting the received light to electrical current (Col.4, L 13-16)
- Providing a sheet of material that lies or traverses between and/or in front of at least two light emitters and at least one light receiver (Figure 1, film 1, light sources 2, 2')
- Controlling with the at least one signal generator, at least one light emitter and at least one light receiver by sending them an electronic synchronisation signal and thereby synchronises the emission and detection of light rays (Col.3, L 32-38, Col.4, L 20-25)

- Driving with the at least one signal generator, the at least two light emitters with different carrier frequencies waveforms and/or phases, and at least one light receiver with both of these frequencies, waveforms and/or phases (Col.3, L 32-45, Col.4, L 20-25)
- Emitting with the at least two light emitters emit at least two rays of light (Col.3, L 5-17)
- At least two rays of light being incident on the stationary or traversing sheet (Figure 1, Col.3, L 5-17)
- Detecting by the same light receiver at least two rays of light grazing the sheet, transparent to the sheet reflected from the sheet or directly from the light emitters (Figure 1, photo-receiver 3)
- An intensity of at least one said emitted ray of light follows the carrier waveform signal and at least one said detected light ray is demodulated from the carrier waveform signal using the electronic synchronisation signal (Col.4, L 22-25)
- Converting at least two of the rays of light to photocurrent (Col.4, L 13-16)
- A signal processed from the common carrier waveform signal is used for rectifying photocurrent signal (Col.3, L 41-45, Col.4, L 22-25)
- Removing at least one DC component from the photocurrent signal (Col.4, L 29, impedance stage removes a portion of the photocurrent signal after it has been converted to DC)

- Diagnosing and observing the processed photocurrent and/or changes in the processed photocurrent to find defects and/or determine characteristics of said sheet of material (Abstract)

However, Kreuzer et al. fails to disclose forming a common carrier waveform AC voltage signal in frequency and a symmetrical 50% duty cycle square wave signal processed therefrom used for rectifying the photocurrent signal.

Preikschat discloses a method for particle analysis comprising:

- Fixing a common carrier waveform AC voltage signal in frequency and a symmetrical 50% duty cycle square wave signal is processed from the common carrier waveform signal and carries equal frequency and phase in terms of zero-crossings (Col.18, L 18-39, sync signal = common waveform, square wave = 50% duty cycle square wave signal)
- The symmetrical square wave signal processed from the common carrier waveform signal is used for rectifying photocurrent signal (Col.18, L 22-28, L36-39)

It would have been obvious to one of ordinary skill in the art at the time the invention was conceived to use the common carrier waveform and symmetrical square waveform of Preikschat since the method described by Preiskchat synchronises the detection circuit with the light source in order to minimize stray light effects and provide for multiple wavelengths without compromising sensitivity.

2. With respect to claim 37, Kreuzer et al. discloses a device for the inspection of films comprising:

- At least two light emitters (Figure 1, light sources 2, 2')
- At least one light receiver (Figure 1, detector 3)
- At least one signal generator connected to at least one of the light emitters and at least one of the light receivers (Col.3, L 32-45, Col.4, L 20-25)
- Means for converting the received light to electrical current (Col.4, L 13-16)
- A sheet of material is arranged between and/or in front of the at least two light emitters and the at least one light receiver (Figure 1, film 1, light sources 2, 2')
- The at least two light emitters are arranged to emit at least two rays of light incident on at least one sheet (Figure 1, Col.3, L 5-17)
- At least two rays of light grazing the sheet, transparent to the sheet or reflected from the sheet are arranged to be detected by the same at least one light receiver (Figure 1, photo-receiver 3)
- At least one ray of light is arranged to be converted to photocurrent by at least one photoelectric device (Col.4, L 13-16)
- The at least one signal generator is arranged to control at least one of the light emitters and at least one of the light receivers by sending them an electronic synchronisation signal and thereby synchronises the emission and detection of light rays (Col.3, L 32-38, Col.4, L 20-25)

- The at least one signal generator is arranged to drive at least two light emitters with different carrier frequencies waveforms and/or phases, and at least one light receiver with both of these frequencies, waveforms and/or phases (Col.3, L 32-45, Col.4, L 20-25)
- An intensity of at least one said emitted ray of light is arranged to follow a carrier waveform signal and at least one received light ray is demodulated from the carrier waveform signal using the electronic synchronisation signal (Col.4, L 22-25)
- A signal processed from the common carrier waveform signal is used for rectifying photocurrent signal (Col.3, L 41-45, Col.4, L 22-25)
- At least one DC component is removed from the photocurrent signal (Col.4, L 29, impedance stage removes a portion of the photocurrent signal after it has been converted to DC)
- The photocurrent and/or changes in the photocurrent are arranged to be diagnosed and observed to find defects and/or determine characteristics of said sheet of material (Abstract)

However, Kreuzer et al. fails to disclose forming a common carrier waveform AC voltage signal in frequency and a symmetrical 50% duty cycle square wave signal processed therefrom used for rectifying the photocurrent signal.

Preikschat discloses a method for particle analysis comprising:

- A common carrier waveform AC voltage signal in frequency and a symmetrical 50% duty cycle square wave signal is processed from the common carrier waveform signal and carries equal frequency and phase in terms of zero-crossings (Col.18, L 18-39, sync signal = common waveform, square wave = 50% duty cycle square wave signal)
- The symmetrical square wave signal processed from the common carrier waveform signal is used for rectifying photocurrent signal (Col.18, L 22-28, L36-39)

It would have been obvious to one of ordinary skill in the art at the time the invention was conceived to use the common carrier waveform and symmetrical square waveform of Preikschat since the method described by Preiskchat synchronises the detection circuit with the light source in order to minimize stray light effects and provide for multiple wavelengths without compromising sensitivity.

3. With respect to claims **26** and **38**, Kreuzer in view of Preikschat discloses all of the limitations as applied to claims 25 and 37 above. In addition, Kreuzer discloses:

- Different rays of light from different emitters targeted to the same receiver measure different properties of the material sheet (Col.4, L 55- Col.5, L 11, wherein light emitter 2 is primarily used for defects and light emitter 2' is for film and/or coat thickness)

4. With respect to claims **29** and **30**, Kreuzer in view of Preikschat discloses all of the limitations as applied to claim 25 above. In addition, Kreuzer discloses:

- The photocurrent is converted to voltage (Col.4, L 13-15)
- Photocurrent or voltage is amplified (Col.4, L 13-16)

5. With respect to claim **31**, Kreuzer in view of Preikschat discloses all of the limitations as applied to claim 25 above. In addition, Kreuzer discloses:

- The resulting photocurrent or a voltage converted from a photocurrent is fed into a fault detection circuit (Col.4, L 13-36, L 59- Col.5, L 5)

The limitations in claim 31, 2nd paragraph-5th paragraph, “means for summing 820, 823,... measurement and inspection method” are not entitled to weight in the method claims since the recited structure limitations herein must affect the method in a manipulative sense and not to amount to the mere claiming of the structure (or means for) performing a particular method. The claim language does not include performing the steps of summing, resetting the circuit, or generating digital defect signals, but rather only a structural means for doing so.

6. With respect to claim **41**, Kreuzer in view of Preikschat discloses all of the limitations as applied to claim 37 above. In addition, Kreuzer discloses:

- The resulting photocurrent or a voltage converted from a photocurrent is fed into a fault detection circuit (Col.4, L 13-36, L 59- Col.5, L 5)
- Means for summing a positive or negative threshold voltage value to the voltage signal entering the fault detection circuit (Col.4, L 59-68, threshold value obtained from uncast film)
- A low pass filter signal path (Col.4, L 20-22)

- Means for resetting the circuit (Col.4, L 67, calibration indicates resetting to null)
- Means for generating digital defect signal pulses when analog defect signals exceeding preset threshold values are produced by demodulation or synchronised detection circuitry of the measurement and inspection arrangement (Col.5, L 2-5)

7. With respect to claim **32** and **42**, Kreuzer in view of Preikschat discloses all of the limitations as applied to claims 25 and 37 above. In addition, Kreuzer discloses:

- The sheet material is film (Abstract)

8. With respect to claim **33** and **43**, Kreuzer in view of Preikschat discloses all of the limitations as applied to claims 25 and 37 above. In addition, Kreuzer discloses:

- The location and/or size of at least one defect and/or other attribute of at least one defect and/or sheet thickness, reflectivity or other physical attributes of the sheet are derived from said optical measurements (Abstract, Col.5, L 6-11)

9. With respect to claim **34** and **44**, Kreuzer in view of Preikschat discloses all of the limitations as applied to claims 25 and 37 above. In addition, Kreuzer discloses:

- One or more defects may feature aspects of the following: holes, pinholes, scratches, spots, stains, cracks, edge faults, streaks, surface faults (Col.5, L 6-11)

10. With respect to claim **35** and **45**, Kreuzer in view of Preikschat discloses all of the limitations as applied to claims 25 and 37 above. In addition, Kreuzer discloses:

- At least one light detector comprises at least one photoelectric device and/or wave guide (Figure 1, photo-receiver 3, pin diaphragm 4)

11. With respect to claims **36** and **46**, Kreuzer in view of Preikschat discloses all of the limitations as applied to claims 25 and 37 above.

Claims **27** and **39** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kreuzer et al. U.S. Patent #4,937,449 in view of Preikschat U.S. Patent #4,871,251 and further in view of Kobayashi et al. U.S. Patent #5,245,671.

12. With respect to claims **27** and **39**, Kreuzer in view of Preikschat discloses all of the limitations as applied to claims 25 and 37 above. However, Kreuzer et al. fails to disclose the three-dimensional structure of a defect is detected with more than one beams.

Kobayashi et al. discloses an apparatus for inspecting circuit boards comprising:

- The three dimensional structure of a defect is detected with more than one beams
(Col.2, L 15-34)

It would have been obvious to one of ordinary skill in the art at the time the invention was conceived to include more than beam for inspection as in Kobayashi et al. in order to detect the three-dimensional structure of a defect since it was well known in the art that three-dimensional defect sensing is performed by a plurality of irradiation directions (Kobayashi et al, Col.2, L 24-26) and to be able to determine the three-dimensional structure of a defect would be desirable in order to classify and repair the defect, steps that would save time and repeated errors.

Response to Arguments

13. Applicant's arguments, see page 12, filed 3/28/08, with respect to claim objections and rejection under 35 USC 101 have been fully considered and in light of the amendment, are persuasive. The objection to claim 31 and rejection of claim 25 under 35 USC 101 has been withdrawn.

14. Applicant's arguments, see page 13, filed 3/28/08, with respect to claim rejection under 35 USC 112 have been fully considered and in light of the amendment, are partially persuasive. Specifically, with respect to the rejection of claims 25-27, 29, 30, 33-39, 43, 44 and 46, the amendments successfully corrected some of the antecedent basis of the limitations and the corresponding rejections have been subsequently withdrawn.

However, with respect to the lack of antecedent basis for the limitation "analog signals" in claims 31 and 41, the lack of antecedent basis for the limitations "detector array" and "detector module" in claim 35 and the indefinite nature of the limitations in claims 34 and 44, the arguments were not persuasive. The limitation "analog signals" in claims 31 and 41 lacks antecedent basis because there is no previous indication that an analog defect signals are produced or exist within the invention. Additionally, the lack of antecedent basis in claim 35 and the indefinite language of claims 31 and 41 were not addressed in the previous office action reply, and therefore remain.

With respect to the rejection of claims 29, 30, 31, and 41 due to an omitted gap between the elements/method steps, the arguments were not persuasive. It is unclear to the examiner if the photocurrent to voltage conversion and amplification and the fault detection circuit follows the

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diagnosis and observation of the photocurrent or removal of at least one DC component, or if the limitations in claims 31 and 41 are simply further detailed explanations of the diagnosis step of claims 25 and 37.

15. Applicant's arguments, see page 13, filed 3/28/08, with respect to the rejection(s) of claim(s) 25, 26, 29, 30, 32, 33, 34, 35, 37, 38, 42, 43, 44, and 45 under 35 USC 102 have been fully considered and in light of the amendments to claims 25 and 37, are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Kreuzer et al U.S. Patent #4,937,449 in view of Preikschat et al U.S. Patent #4,871,251.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to REBECCA C. SLOMSKI whose telephone number is (571)272-9787. The examiner can normally be reached on Monday through Thursday, 7:30 am - 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on 571-272-2059. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/L. G. Lauchman/
Primary Examiner, Art Unit 2877

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